

## SUPPLEMENT TO THE " BUTTERFLY RACES AND ZYGAENAE OF MACEDONIA."

By ROGER VERITY, M.D., F.R.E.S.

The materials brought back by Querci last year, and which I have examined, were mostly collected during 1936 in the sunny, open neighbourhood of Skala, 300 m., at the foot of the Olympus, not visited during the two previous years. They have turned out more different from those of the much more Alpine surroundings of S. Dionisio than might have been expected, considering the comparative proximity (four hours walk) of those two localities and the difference of altitude of only about 500 m., so that some species have, distinctly, another aspect, and others which are very scarce in one locality are abundant in the other.

Interesting forms were also obtained by collecting in the Salonika region during the height of the summer and the second or third generation of some species has, thus, been exactly determined.

I, therefore, think this Supplement to my notes on Macedonia in the *Entomologist's Record* of 1936, Nos. 11 and 12, and 1937, Nos. 1, 2, and 3, will be useful to record the facts I have, since then, made out.

*Erynnis tages*, L., race **magnatages**, nom. nov.:—I have stated, in my previous paper, that the race of the Olympus is *subclara*, Vrtý. This applies to the population of S. Dionisio, 800 m., specimens of which were collected in 1935. A series of Skala, 300 m., affords, in the II generation, a decidedly distinct facies, which is all the more striking that this species varies so little in the whole of its broad range. The I generation of Skala, old female individuals of which were on the wing till 20th June, is a perfectly nominotypical *tages*. The II appeared at about that time and fresh specimens were found till 25th July; it is well worth distinguishing, and I name it *magnatages* because it is, first of all, larger than any *tages* I have seen, the length of the forewing being about 15 mm., against the usual average 13, and the expanse about 28, against the usual 25; the broader wings and the greater elongation of the hindwing at the tornus increase their surface still more; the tone of colour is decidedly brown and very warm, usually with a golden sheen; in about 30% of the individuals the dark spotting and the light grey spaces are entirely lacking and the whole wing surface is of a uniform brown colour; in about as many they are vaguely and partly perceptible and even in the rest they rarely stand out prominently; the underside is of a light, warm, brown.

*Carcharodus lavatherae*, Esp., race **nigrobicurata**, nom. nov.:—The capture, at Skala, 300 m., during the last days of June and the early ones of July, of several specimens of this new form has been an interesting addition to the little known oriental ones of this species. It seems to sustain Reverdin's latest view that the very distinct race of the Taurus Mts. of Asia Minor, which he had illustrated, in the *Bull. Soc. Lép. Genève*, iii, p. 103 (1915), under the name of *tauricus*, as a distinct species, fully belongs, on the contrary, to *lavatherae*, although it certainly is a very marked variation, entirely proper to the east of its range. In Vol. vi (1929) of the same *Bulletin* there is, in fact, a posthumous paper by him, in which he states the results of the examina-

tion of a specimen from Mt. Athos St.-Andrew (13th June); he had, at first sight, referred it to *tauricus*, but a closer inspection showed that its genitalia did not exhibit, in the least, the characteristics observed in the holotype male of the Taurus and agreed, instead, exactly with those of *lavatherae*; also, to the naked eye, several features of *tauricus* which had been deemed constant and specific were lacking in the Mt. Athos example, and, for instance, the extent of the translucent spaces of the forewing reduced, as compared with *lavatherae*. There was, therefore, obvious transition between the latter of the west and *tauricus* of the east in that form of Macedonia, but Reverdin states explicitly that it has decidedly the reddish general colouring of *tauricus*.

The form of Mt. Olympus agrees exactly with Reverdin's figures of *tauricus* by its large size and thick build and, what is more, by the smallness of the clear spaces on the hindwing, the premarginal ones being rendered nearly invisible by a grey shading, but the general colouring is of a cold, dark, grey, with perfectly black patches on the forewing and bands on the hindwing, which recall the facies of *Spilothyrus alchymillae*, Hüb. = *altheae*, Hüb., and differ from all the *lavatherae* hitherto known; also on the underside the forewings are more broadly and more deeply black and, in the male sex, the dark shades of the hindwing are dark grey, instead of pale reddish; in the females they are of an ochreous colour, similar to that of Oberthür's figure 607 in *Et. Lép. Comp.*, Vol. x, of a specimen from Akbes, in Syria, which is the nearest approach to the Olympus one, also by its dark upperside, although it is of a much more reddish tinge and smaller. I had given it the name of *ambigua* in the *Ent. Rec.* of 1925, p. 43, when I was in doubt as to what species it belonged exactly, as Oberthür had been before me, and I thought it probably was a *Spilothyrus stauderi*, but, since then, I have received from Fritz Wagner a series of Ak-Chehir, in Anatolia (18th to 26th June), which evidently agrees with it entirely and which is a *lavatherae* intermediate between race *rufescens*, Obth., of North Africa, found also in some localities of Asia Minor, and the race of Mt. Olympus I have just described and I propose naming *nigrobsecurata*. I must add that, in the latter, the translucent spaces of the forewing are quite as large as in the average *lavatherae* of the west, so that, evidently, there is, in these various forms, a great deal of mixture of the different characters and they can only be extreme variations of a single species; it does not seem as though the group *nigrobsecurata-tauricus-ambigua* could even constitute a different exerge from the group of western races, considering the genitalia found in the *tauricus* of Mt. Athos and considering that in Asia Minor there are races which can well be referred to *rufescens*, as shown by specimens of Beirut and of Amasia in my possession; thus there evidently is actual transition from them to *tauricus* through *ambigua*, as there is to the western *lavatherae* through the race *australissima*, Vrtý., *Ent. Rec.*, 1925, p. 41, of some localities of North Africa, such as figured by Oberthür (figs. 603-604, which I have taken as my typical couple), and of southern and central Spain. As Warren and subsequent authors have taken *australissima* to be synonymous with *rufescens*, I must again lay stress on the fact that they are perfectly distinct; my aforesaid series of Asia Minor is entirely made up, in both sexes, of the very reddish form, with ochreous bands on the underside of the hindwings, whereas one, for instance, from Albarracin only resembles it,

to a moderate degree, in a few exceptional females, as noted by Querci, and it would be quite a mistake to apply the name to it, as a whole in the way Zerny has done in the *Eos*, 1927, p. 343; the usual facies is the one of Oberthür's figures 603-604 and the racial name, therefore, is *australissima*, describable as being of a slightly more reddish, general, tone of colour than nominotypical *lavatherae* and *australior*, Vrty., of Italy. It will be interesting to see if, in the Balkans, there exist transitional forms and races also between the two latter, known from as far east as Carniola and Albania, and *nigrobscurata*, or whether these forms stand at the opposite ends of a single series of grades. Rebel and Zerny have noted that in Albania the underside markings are more prominent than in nominotypical *lavatherae* and this might be a first step towards *nigrobscurata*, but no other exact information seems to be available.

*C. orientalis*, Rev.:—Having seen and obtained Skala specimens of May and June, I am now in a position to state that they can well be referred to the nominotypical form and more exactly to the individual one, in which the grey of the upperside is pale and cold in tone; a small specimen, with the white underside spaces of the hindwing standing out sharply on the grey, strongly recalls *C. marrubii*. The II generation does not differ either from *postorientalis*, Vrty. (25th April 1928) = *aestatis*, Graves (May 1928), of Constantinople.

*Pyrgus serratulae*, Ramb., race ***infraobscurata***, nom. nov.:—A few specimens of this species, which had not been seen before, were collected in 1936, from the 15th to the 21st of June, at Skala, 300 m., and on the path to S. Dionisio, at about 800 m. They strike one at once as different from the other races hitherto known; in size they are distinctly larger than the usual ones of the species, but not as much as *major*, Stdgr., of Asia Minor, or *magnagallica*, Vrty. = *occidentalis*, Lucas, of France. On the upperside the white spaces are well pronounced on the forewing, but, on the hindwing, there is not the slightest trace of them, or even of grey shadings, in either sex, as there is in nearly all the *serratulae*, the rare exceptions only being individual in the other races. The chief characteristic of this one is, however, afforded by the underside of the hindwing, where the nearly absolutely constant yellow colour of the *serratulae* of all the other regions, except for a few aberrations, is, on the contrary, constantly and entirely replaced here, in both sexes, by cold, blackish and grey ones, whilst the narrow, clear space, which stretches along the outer margin of both fore and hindwing and is well known as a distinctive feature of this species, is of a bluish, slate grey, instead of white or dirty white, as in the other races. All my Skala specimens of both sexes also exhibit another very unusual peculiarity; Warren had remarked that, in *serratulae*, "the rarest form of underside variation is the reduction of the white markings"; now, in these specimens, the white spaces are reduced to such an extent that some of the smaller ones are entirely missing and the central white band-like one is reduced to a row of small separate spaces; they are also partly shaded with pale grey. These Skala specimens I take as cotypes of *infraobscurata*. The few I have from S. Dionisio are quite as grey, but broad white spaces exist on the under surface, as in any average *serratulae*, and stand out



sharply, as in *planorum*, Vrtý.; their extent is, however, distinctly not that of *balcanica*, Warren, from Montenegro.

*Spialia orbifer*, Hüb., race *tesselloides*, H.-S., II gen. **postesselloides**, nom. nov.:—The specimens collected at the end of July, in the neighbourhood of Skala, are very much smaller than those of the I generation, which is unusually large (18 to 20 mm. of expanse, against 22 to 25). In my previous paper on Macedonia I had applied Rebel's name of *minor* to the II generation of the Olympus, but, on second thought, it seems to me it would be more exact to restrict the latter name to the II of the nominotypical race and to distinguish, by a new one, that of *tesselloides*, which is quite as distinct from it as the I, and by the same features: much lesser extent of the white spaces.

*Gegenes pumilio*, Hoffm.:—Now I am in possession of specimens collected in the mountains above Skala and Stavros, at about 800 m., <sup>Skala</sup> 3rd June, I can confirm Querci's opinion that the race is quite similar to the Italian, nominotypical, one.

*G. nostrodamus*, F., race *nostrodamus*, F.:—Having obtained also the specimens of this species, recorded in my previous paper, I am able to determine the race they belong to, and I see they differ in no way from those of "Barbaria," described by Fabricius originally, or from Sicily, or Asia, and they show no tendency at all to vary in the direction of race *pumilio minima*, Vrtý., the northern form, I have described from Tuscany, which recalls *pumilio*, Vrtý., much by its smaller size and blacker tone of colour on both surfaces, so that the genitalia alone distinguish it with certainty from the latter. The Olympus examples of the two species differ strikingly from each other. The *nostrodamus* collected on 8th June, at Skala, are a little larger than those found, on 1st July, lower down, at about sea-level.

*Scolitantides orion*, Pall., race *orion* trans. ad *metioche*, Pall.-Frühst.:—The large series of specimens brought back by Querci, apparently, shows that those I had seen, when I attributed the Olympus race to *metioche*, Frühst., did not convey a correct idea of it. At Prionia, 1500 m., whence were my examples, this dark form, with nearly no blue above, except indistinct marginal lunules, is quite unusual in the male sex, which is, on the contrary, quite as blue, on an average, as the nominotypical *orion* degree of it; it is more frequent in the female sex, but far from preponderant, so that the race can nearly be referred to the nominotypical one. What had led me wrong in my previous judgment had been that most of the specimens sent to me were very worn and rubbed, so that they had lost a good deal of their blue scales. Another series, obtained at the much lower level of Skala, in 1936, contains a slightly higher percentage of *metioche* and is, on the whole, rather smaller in size.

*Glaucopsyche cyllarus*, Rott., race **parvandereggi**, nom. nov.:—In my paper of 1936 I have applied the name of *andereggi*, Rühl. to the race of Salonika and of the Olympus. Now I have before me further materials from both these regions and from the hills above that town, at about 350 m., and from the same altitude at Skala, I find it necessary to be



more exact and to make the following distinction: that the females do always belong to that dark form, with no trace of blue on the upperside, the males have a thick black marginal band and the underside of both sexes is distinctly darker than in nominotypical *cyllarus* of the German lowlands, so that all these features agree with the typical *andereggi* of the Valais and the western Alps, but, on the other hand, the size is very much smaller than the one of the latter, both on an average and in that its most characteristic giant males are not produced at all, nor is its other peculiarity, consisting in the very large size of the black spots on the underside of the forewing.

The wing expanse of this Macedonian race is of about 25 mm. in the male and in most females and varies from 20 to 28 in extreme individuals of the latter sex. The size, therefore, agrees with that of most southern races, but is very much smaller than the usual one of the *cyllarus* of Central Europe, not to speak of the very large males of *andereggi* mentioned above, and I conclude a distinctive name is necessary for this race. I select my Salonika specimens as "cotypes," noting, however, that it is not a purely eastern race and that the same name can be used for perfectly similar ones occurring further west, such as in the Po basin.

*Aricia anteros*, Fr. :—The large series of specimens collected in various localities of different sorts show notable local differences in the average aspect, which are well worth recording, although it is, no doubt, more correct to call them "forms" than "races," even though one uses the latter term in a broad sense, as we have been doing in connection with other species. Thus:—

At Salonika the I generation (the II has not been collected) is usually large, of a bright blue tinge and with large underside lunules, of a fine, rich, orange colour. This I take to be the nominotypical *anteros*.

At the highest altitudes on Mt. Olympus, such as at Prionia, 1500 m., only one generation is produced; it is quite as large or even slightly larger than the preceding, but the colours are less intense on both surfaces, the lunules of the underside being distinctly smaller and paler and those of the upperside of the female often entirely obliterated. It might be named **modicior**, nom. nov.

At Stavros, 700 m., on the same mountain, but in a deep, damp, gully, the I generation is smaller and very much poorer in pigment, so that the blue of the upperside of the male has an entirely different tone from the two preceding forms, tending to lilac and strongly iridescent, and the underside lunules are very small and of a dirty, yellowish, orange: form **inanis**, nom. nov.

At S. Dionisio, 800 m., the striking characteristic consists in the small size. The I generation is considerably below the average of all the preceding forms (length of forewing 13 mm. and expanse 23, against 15 and 26): form **minorata**, nom. nov. The II generation is very much smaller and even half the size of the I in many individuals, which are, thus, extremely minute. In both generations the colours are similar to those of the Prionia form, so that the II cannot be referred to *altera*, Züllich, of Bulgaria, because the latter is described as having the underside of a deep, warm, brown, in both sexes, and the upperside of the female of a lighter brown than the I generation, whereas nothing

of the sort is to be seen in this one, which I, consequently, propose naming *minoratissima*, nom. nov.

*A. allous*, Hb. = *medon*, Hüfn., race *macedonica*, Vrtv.:—To the description of my paper of 1936, I can add, on the strength of further materials seen and obtained for my own collection, that the typical generation of *macedonica* is the I one, always with a cold grey underside, whereas the II is sometimes of a bright fulvous and has no trace of blue metallic scaling at the base of the wings. I said that this insect is of a larger size than the *agestis* of the same region; I can now give the precise average measurements as being 15 mm. of length of forewing and 25 of expanse in the male; the typical female measures 15 and 28 respectively, but the wing surface is greater than the one of the male, owing to their broader shape. I can also add that this specimen has very large orange lunules on a gray underside; on the upperside their colour is of a light tone; what reminds one of *icarus*, as observed in my original description, is that, on the hindwing, each lunule has a large black spot, standing out on the brownish groundcolour, and narrowly edged, on the hind-side, by a few slightly bluish scales.

In my original description of *macedonica*, in my previous paper on this region, I said that Querci had observed, on the Olympus, a state of things similar to that existing in the Iberic peninsula and in the Atlas, where two species (*montensis*, Vrtv. and *cramera*, Ersch.) have been detected in the insects, once attributed to *agestis* alone. It is many years since I suspected the same thing in connection with some mountain races of Northern Italy, as distinguished from the lowland ones and from those of the mountains of peninsular Italy. Now I have seen the work of Bayard, in the *Livre Jubilaire de M. E. L. Bouvier*, Paris, 1936, p. 111, I find I must state, at once, to remove any misunderstanding and confusion, that, when I described *macedonica* as a race of *montensis*, I had not seen Bayard's figures of the *falces*=*gnathos*=*subunci*, showing that the latter has a culminating degree of length and thinness of the free branch of that process, so that it can well be a distinct species, as suggested by that author. This feature, together with the other, still more exclusive one, I had recorded when I named *montensis* in 1928, consisting in the position of the premarginal orange lunules, which are nearer to the margin than in *agestis* on both surfaces, is, however, nearly proper to the Iberic peninsula and to Africa, so that it has now become clear that *macedonica* does not belong at all to *montensis*, as restricted by the aforesaid characters.

On the other hand, there is no doubt, as stated above, that also outside those regions there exists a specific duplicity, corresponding to *montensis* and to *cramera*, although it does not seem to be as conspicuous, with regard to structure and to pattern of wings. To establish the limits between those twin groups and the names they should bear it must be noted that the races, which Bayard has lumped together under the name of *agestis*, exhibit a remarkable range of variation, in connection with the *falces*, as shown by his own figures and as found also by me, in my own mounts of the male genital armatures from many regions. On one side those variations lead up to the extreme *montensis* degree: not fully in Bayard's figures, but quite so in some of my specimens from very high altitudes in the Tuscan Apennines (Abetone pass, 1400 m.), and from the Maritime Alps (Valdieri, 1375 m.). On the other

side they reach the aspect of the less extreme *cramera*, as shown by Bayard's fig. 20 (Sicily) compared to 27. It can, next, be seen that the first kind of falces, just mentioned, is furnished by the races of Northern Europe and the northern parts of Central Europe and by those of high mountain masses, further south, *i.e.*, by the races which only produce one generation, or a scanty and nearly exceptional second one, and which resemble *montensis* by their long, pointed wings, by their, usually, deeper black colouring and by the much lesser development of the pre-marginal orange lunules, as compared with the following group. The oldest name, given to a race of this group, would be *medon*, Hüfn., from Berlin, but, as it is a primary homonym, the next one, *allous*, Hüb., must be used, to distinguish it, as a whole, from the other, apparently, specific entity. Hübner and Geyer's figures represent the widespread race of Northern Germany, parts of Northern France, and of England and the greater part of the Alpine region. In the same group are included: *alpina*, Stdgr. (the minute race of high altitudes), *inhonora*, Jach. of Russia, *macedonica*, Vrty., *montiummagna*, Vrty. of high altitudes (1400 m.) in the Apuane Alps of Tuscany, and *artaxerxes*, F., whilst *salmacis*, Stph. is presumably a result of interbreeding with the next, *agestis*, group and, in the Maritime Alps, there seems to be genitalic evidence of interbreeding with *montensis*.

The other group, which is an approach to *cramera*, both by the form of the falces it usually exhibits, by the extent of the orange lunules, by the less deep and warmer tone of colours and by the fact it produces regularly either two or three generations, according to latitude and altitude, includes the nominotypical *agestis*, Schiff., of Vienna, which is widespread in the southern parts of Central Europe, on the west coast of France and in England, and in the mountains of the south, where the surroundings are too dry and warm for the *allous*. This is, therefore, the species which goes on bearing that name in this new, restricted, sense and, in it, must also be included the following degree, *gallica*, Obth., and the extreme one *calida*, Bell., with its I gen. *ornata*, Stdgr., as well as other races, such as *pallidefulva*, Vrty., *subcalida*, Vrty., *fracandida*, Vrty., *nizra*, Moore (Kashmir), according to a specimen I have examined genitically; I have mentioned above the race of high altitudes (1400 m.) in northern Tuscany, in which I have found the falces to be like those of *montensis*; to the naked eye it looks perfectly similar to the *pallidefulva*, I have described from lower altitudes in that region and which, on the contrary, is a highly characterised *agestis* by its very large pre-marginal, orange, lunules.

Presumably *cramera* and *montensis* have derived from migrations of the early Miocene by the African route, as they are both found in the Atlas, and the latter has spread, together with *Lysandra albicans*, after the Glacial Periods, through southern France, to the Maritime Alps and northern Tuscany, where it has mixed, respectively with *allous*, which had, then, got there by the Siberio-Russian route, and with *agestis*, which had derived from migrations of the later Miocene, such as the moufflon one, and got back to Northern Italy, after the Glacial Periods, from its southern refuges. Evidently, the specific distinction between *montensis* and the two latter is not so great as to reach total sterility and they have interbred. This hypothesis is suggested by the genitalia, similar to those of *montensis*, I have found in



those two cases, as stated above. It, of course, casts a doubt on the full specific distinction of *montensis* from *allous* and *agestis*. As there does not seem to be a very sharp distinction between the two latter, either, where they meet, in Central Europe, and the southern, *calida*, race of *agestis* is, genitally, a near approach to *cramera*, at the opposite end of variation, all the species, we have just made out, afford an interesting case of relationship, which is, apparently, best defined as one of "partial" specific distinction, standing just above the *exergic* distinction, in that some of their races occasionally exist on the same grounds, without interbreeding to any extent, as *allous* and *agestis* do on Mt. Olympus; this evidently happens because the race of *agestis* is, there, more southern and, therefore, more distinct from *allous* than the nominotypical one of Central Europe, which, presumably, does blend with it, considerably, in that region.

*Polyommatus chiron*, Rott. = *eumedon*, Esp.:—I have pointed out that the series of specimens collected on Mt. Olympus, at 300 m., contained a large percentage of individuals exhibiting the characteristic of form *fylgia*, Spang (no white streak on the underside of the hindwing). To be quite exact in this record, I must, now, add that I have seen the remainder of that series and that it consists in an intermediate form, with a streak, but short and very thin.

*Lysandra thersites*, Cant.-Chap.:—The examples found at Salonika in mid-summer are extremely small, smaller, in fact, than any others I have seen from Europe and similar to the form *postmicrorientalis*, I have described from the very arid region of Tecde, near Malatia, in western Kurdistan, in the *Bull. Soc. Ent. France*, 1935, p. 244.

*Everes alcetas*, Hoffm.:—The capture of a female of this species, on 15th April, above Salonika, at about 300 m., adds a species to my previous list. It is somewhat larger than the usual, average, size, and it has a well marked, though very thin, as it always is in *alcetas*, orange lunule on the underside; the ground-colour, on this surface, is decidedly grey and all the black markings well marked, so that it belongs to the same race as the typical Austrian specimens and, in no way, to the small and pale *diminuta*, Vrty., of the I generation of the south.

*Tarucus balkanica*, Freyer, with I gen. *clorinda*, nom. nov.:—No one has, to my knowledge, recorded any definite seasonal dimorphism in this species, so that I must do so in connection with the Salonika examples, which exhibit it most distinctly, and I dedicate the spring form to the Signora Querci, whose energy and enthusiasm, in collecting, is well known. Freyer, and also Herrich-Schäffer, who gave this species the name of *psittacus*, very soon after the former had described it, have figured specimens, from "Turkey," of the II generation, as shown by their large size and clear ground colour, in the male sex, with a thin marginal black streak. Most of the specimens of that generation (mid-August) from Salonika are rather smaller and darker, but, nevertheless, the I generation of May differs from them, always very markedly, by being still smaller and darker. Freyer's male has a forewing, which measures 10 mm. in length and an expanse of 19, at the apex, where the fringes begin; the average expanse, at Salonika, is about 18 in the II generation, whereas in the I the length of forewing is 8 to 9, in that sex, and the expanse 16 to

17. The minute size, corresponding to these measurements, is accompanied by a much darker colouring of the upper surface, in that the tone of black is very much deeper and colder and the extent of the black markings is greater; the neuration is streaked with this colour, more or less thickly, and the outer margin is broadly shaded with it, so that the clear spaces, with a violet sheen, of the male, are very much broken and limited in extent, and, in the female, the white ones are, practically, abolished; in this sex, the whole wing surface is, thus, uniformly black, instead of being variegated, as it is in the II generation. On the underside the black pattern is, in both sexes, usually thicker in the I than in the II generation and the metallic pre-marginal spots of the hindwing are less coloured, in that they are more silvery and less green or blue.

*Syntarucus piritheus*, L. ab. **posticelatenigra**, nom. nov.:—This species, usually known as *telicanus*, Lang, varies so extremely little that it is well worth recording a form, collected at Skala, on 19th June, which I have never seen before: it is a male specimen, which bears a broad black band along the whole outer margin of the hindwing; its inner outline is tolerably sharp and parallel with the margin, at a distance equivalent to the extreme inner side of the two black dots, which are rather larger than usual and just perceptible, inside the band, owing to their deeper black tone.

*Thecla quercus*, L.:—On the strength of specimens from 850 m. to 1200, on the Olympus, I have applied the name of *interjecta*, Vrtý., to the race they represent, but I must, now, record the further fact that the species has been, subsequently, found also at Skala, at 300 m., and that it has another facies, there, which exactly agrees with the nominotypical form of England and Central Europe, for it is larger than *interjecta*, the underside is of a darker tone of grey, the black streaks are more accentuated, and the orange ones larger and of a warmer tinge; all these features are more marked in the male sex, whilst the female, as compared with it, gives the impression of being transitional to *interjecta*.

*Gonepteryx cleopatra*, L.:—Having seen a considerable number of specimens, I am, now, in a position to record that the Macedonian race belongs to the *dalmatica*, Vrtý., form, although some individuals do not have, to its fullest extent, the characteristic rounded shape of the wings, with a strongly convex outer margin and nearly no angle at apex of forewing and on hind margin of hindwing; most of them are only transitional to it. It must, furthermore, be noticed that all the females are of the entirely bright yellow *florii*, Turati, form, so that the race, as a whole, must bear this name, as contrasted to the Dalmatian one, whose females are of the more usual greenish-white colour.

*G. rhamnii*, L.:—I have referred the race of Salonika and the Olympus to *transiens*, Vrtý., but Skala specimens, of June, are so indented along the hind margin of the hindwings that they may better be looked upon as transitional from that race to the more extreme *meridionalis*, Röber, described from Algiers and southern Asia Minor.

It is noteworthy that, at Skala, also some *farinosa*, Z., were found, so that the three western species of *Gonepteryx* fly together, there, as they do in many localities of Asia Minor.

*Leptidea duponcheli*, Stdgr.:—I have named *fragilis* the race of Salonika, on the strength of the small form, which constituted the I generation, in the hills above that town, in the year 1935. In 1936 Querci was quite taken aback when the species began to emerge and exhibited a strikingly different look, for its size had increased and its structure had acquired nearly the normal nominotypical aspect. What had remained of *fragilis* was the yellow tinge, particularly strong at the base of the wings and evidently transitional to the entirely bright yellow form of Syria, *xanthochroa*, Vrty. There are, thus, some features, which do justify a distinctive name for the race of the east, as contrasted to the nominotypical one of Southern France and of the west, and that name will have to be *fragilis*, although its fragile appearance does not show constantly, to its fullest extent, either in all localities or in all years.

*Pieris manni*, Mayer:—It is noteworthy that two perfectly fresh males collected in the hills, above Salonika, on 16th November 1936, correspond, in aspect, to those of the IV generation, *septembrina*, Vrty., of September, in Peninsular Italy. There remains to be made out whether they belong to the same generation, perhaps retarded, at Salonika, by a long summer pause, due to extreme drought and heat, or whether they belong to a V generation, more frequent, there, than the rare and scarcely represented, frail form, *quercii*, Rostagno of Italy, in October. As far as facies goes, the two Salonika examples are different from the latter and similar to the former, for they are fully of the average size and strength of June nominotypical II generation *manni* and only differ from it by having a broader suffusion of black scales at the base of the wings, on the upperside, and a thicker one all over the hindwings, on the underside; the black markings of the upperside are large and of a deep black, with sharp outlines, in one specimen; they are smaller and partly veiled with white scales in the other, as it often is the case in the variations of all seasons and localities. This late form must be named **postmanni**, nom. nov., in the Balkanic nominotypical race, just as it has been named in Italy, in the Valais, in France, etc., where the corresponding form differs, in each case, from this one by the same racial features as the other forms and generations do from their corresponding one.

*Parnassius mnemosyne*, L.:—Prof. Kollar of Vienna, one of the specialists of the *Parnassiidi*, has pointed out, in *Lambillionea* of 1937, p. 97, and pl. VIII, some differences, he has detected, between the race of the Olympus and the Bulgarian *buresschi*, Bryk, to which others had referred it; he has, consequently, given it the new name of *clorinda*, in honour of the Signora Querci, who is the captor of the very few known specimens, from Prionia, 1500 m., and from the valley between Stavros and Skala, from 800 to 300 m.

*Parnassius apollo*, L., race *olympiacus*, Kol.-Rebel = *thessalicus*, O. B. Bang-Haas:—I have stated, in my previous paper, that Querci had, in 1935, found, on the Olympus, the *apollo* to be entirely different from the descriptions and figures of the three authors just mentioned. In 1936 he was very surprised to see that, in exactly the same locality, all the *apollo* had changed facies and had come to agree perfectly with the aforesaid descriptions. They were also very much scarcer than in the



preceding year. The explanation of this phenomenon presumably rests in the very great difference of climate, between those two years, during the spring months, when the larvae were feeding: mild and clear in 1935; cold and damp in 1936.

This experience is very instructive, like the *Leptidea* one, mentioned above, because it shows how necessary it is to make a distinction between purely somatic differences, produced by deviations during the development of the individual, due to differences in the surrounding conditions, and really constant hereditary, differences. Unfortunately this distinction is, in practice, extremely difficult, not to say impossible, in most cases, as it could only be accomplished by breeding experiments, on a large scale, in various kinds of surroundings, to see if the strains, one wants to compare, vary in the same way, under the same external conditions, or keep up constant differences of aspect, which could, then, only be due to distinct hereditary factors. It is this difficulty and consequent ignorance on our part, which induce me to use the term of "races" for aggregates of individuals, all or the majority of which exhibit some features distinguishing them from those of other co-specific aggregates. The term is usually looked upon as conveying the idea of characteristic hereditary factors and, in this sense, it would not be correct, as applied to many cases in which the features are of somatic origin, but this possibility can be borne in mind till it becomes possible to eliminate them by the aforesaid experimental proofs. It is no good trying to do so by rule of thumb or relying on some difference of structure to conclude there must be a hereditary one; the genital armature has, for instance, even been seen to vary regularly in the different generations. What, on the other hand, seems quite wrong is to use the term of "subspecies" in place of the more vague and less emphatic one of "race," as most authors are doing nowadays, because the former is recognised by the International Code of Zoological Nomenclature, and they want their discoveries to be enforced by it. It should, instead, be reserved for unquestionable hereditary differences, well fixed in natural surroundings and, thus, superior in rank to the very variable domestic breeds, kept up by artificial selection. Finally, I do not use the term of "local form," either, because nearly all the variations in question are not local at all, as they turn up, individually, also in the regions, where another form predominates. When they don't, one can be pretty sure one has a "subspecies" before one, in the true sense of the word, and "local form" would be a synonym. The simple word "form" would, apparently, in the present state of things, be the most correct expression, as a broad word of ignorance, like the old-fashioned "variety," but it has the defect of being rather too individual and of conveying no idea of an aggregate, such as are the entities, which I conclude had better, for the present, be called "races," till our knowledge about them has been improved and we can start out on new lines. Let us, in the meantime, take note of the experiments, which nature itself provides, and realise, on the strength of the Olympus *apollo*, that nearly none of the dozens of "subspecies," attributed to it in the last few years, are anything of the kind and that most of them are even scarcely "races," in the broadest sense of the word, as defined above, for they respond at once to external changes and alter their features to a most unusual extent. Yearly changes of this sort are, however,

much more frequent and conspicuous in many butterflies than has, as yet, been realised. The particularly bad weather of 1937 has, for instance, changed the aspect of several species in the Sibillini Mts. of Central Italy: the *apollo* collected, there, by the Quercis are smaller, the *ergane* larger, the *coridon* larger and brighter, too, the *alberganus* = *ceto* have broad fulvous bands, the *tyndarus* are less silvery on the underside, the *athalia* larger, to the extent that the "racial" names given to them, on the strength of other series, could not, strictly speaking, be applied to these series of specimens, because somatic features evidently prevailed amongst those described. It is no good discussing whether "local form" is preferable to "race," or not; "yearly forms" would have to be distinguished as well and this would not be fully satisfactory, yet. What one wants is to start on the new line of recognising "somations," when it is possible, and, as this term has already been erected by the students of genetics, making use of it, possibly with the indication of the external factor, which produces the form one is dealing with; thus, for instance, if the Olympus *apollo* of 1935 is more or less similar to *liburnicus*, Rebel & Rogenhofer, we will have: race *liburnicus*, som. *liburnicus*, and som. *olympicus*, which can be usefully developed into: *caloris et siccitatis somatio*, or *cal.-sicc. som.*, and *frigidi et humoris somatio*, or *frig.-hum. som.* It must, however, first of all, be made out which of the so-called subspecies are to be grouped together as somations deriving from the same hereditary factors. Here, for instance, another *apollo* has been described lately from Macedonia and named subspecies *macedonicus*, Ros.; the cotypes were from the Kobelija and Shar-dagh, in N.W. Macedonia, and from the Mala Rupa, in S. Macedonia, between Gjeogzeli and Monastir, at an altitude of about 1600 m. Judging by Bollow's figure of a female in the Supplement to Seitz, it is a very white form, standing close to *liburnicus*, Rebel & Rogenhofer, of the Velebit Planina Mts., in Croatia, and not a different subspecies at all.

*Papilio machaon*, L.:—A few specimens, captured in 1936, now enable me to determine the Macedonian forms: The I generation, of April, from Salonika, has very broad black bands and is more or less the same as the one of Sicily, which agrees with Hübner-Geyer's figure of *sphyrus*. The II generation, as found on Mt. Olympus on 20th July, in very worn conditions, both at Skala, 300 m., and at Prionia, 1500 m., belongs to the form with the most reduced black pattern: nervures on disc scarcely edged with black scales at all, premarginal band very narrow on both fore and hindwing, basal suffusion of the latter nearly entirely abolished and abdomen with only a narrow streak of black along the middle of the dorsum; by these last features they correspond to *aestivus*, Zeller, of Sicily, but they are of smaller size, not being, like the latter is, larger than the average one of the species; for the same reason they differ still more from *gigantea*, Vrtý., of Dalmatia, and, in fact, they quite resemble the specimens I have collected at Portorose, in Istria, and I look upon as intermediate between the summer generation *aestivoides*, Vrtý., of Central Europe and the more southern *gigantea* of the Balkans. These I found, in worn condition, on 10th September, and I have others, just like them, of 21st, collected by Montague at Kalabak (Macedonia), so that, according to all probabilities, in the Balkans, there is a III generation, in September, which has exactly the same facies as the II

of July and not that of *tertiana*, Vrtý., of Northern Italy, with broader black bands. On the other hand a single, very fresh, male, caught by the Quercis at Salonika, on 16th September, shows there is no absolute rule and variations occur, according to localities, for it is considerably darker than *tertiana* or *sphyrroides*, Vrtý., and it looks, by its thick black patterns, short tails and rather small size, like a reversion to the spring *sphyrus*, except that the frontal tuft of hair is quite short and the abdomen naked and black only on the back; in short, it exactly agrees with form *revertens*, Vrtý., which occasionally appears, in Italy, at the end of September and in October, as a IV extraordinary generation of favourable years.

*P. alexanor*, Esp.:—A female of this extremely scarce species was, at last, captured at Skala on 9th June, in very bad conditions of old age, but sufficient to show that the race of the Olympus is decidedly *attica*, Vrtý., for it is identical with my female "type" and it has the small size and the broad black bands, which characterise it and are just the opposite to the features of *magna*, Vrtý., of Dalmatia.

*Coenonympha pamphilus*, L.:—The II generation has been collected also at Salonika in mid-August and is a highly characterised *marginata*, Rühl, with some examples of very large size.

*Hyponephele lycan*, Rott.:—Having obtained females from the Olympus and from Naussa, in the Bermion Mts., I am now able to record the facies also of this sex in the region we are dealing with; in my other paper on it I remarked that the male resembles *catictera*, Turati, from Zeitun, in the Anti-Taurus, but that the female of the latter is unknown, so that the actual identity of these two races cannot, yet, be considered sure. The Macedonian females belong to the southern type, with a rather pale underside: yellowish fulvous forewing and cold, silvery, grey hindwing; the upperside is rather boldly marked, like *quercii*, Vrtý., of Portugal, but with smaller ocelli, as in many *magnobscura*, Vrtý., of Central Europe.

*Agapetes galathea*, L.:—I have stated the race of the Olympus and of the Bermion Mts. agrees very well with the *tenebrosa*, Frhst., of Trieste. The materials which have come to hand, now, require further analysis: to be perfectly exact, it must be noted that the form, or somation, as it certainly can be called, according to the remarks I have made in connection with the *apollo*, quite similar to the Trieste one, was found along the path from the Stavros fountain to the S. Dionisio monastery, at 800 to 900 m. An interval of about 300 m., in which no *galathea* were to be seen, separated it from a distinctly different one, which can well be described as gigantic, in size (male: length of forewing 30 mm. and expanse between the apexes 50; female: 33 and 55, respectively) and which is also less melanic, so that the white spaces at the base of the wings are, in particular, more extensive; it is worth distinguishing by the name of **tenebrogigas**, nom. nov.

On the Bermion Mts., near the village of Seli, at about 1400 m., flies a *galathea*, which contrasts strongly with the preceding by its remarkably small size (male, correspondingly: about 22 and about 40; female: 25 and 43) and which is nearly as fully melanic as *tenebrosa*, on an average: **tenebronana**, nom. nov.

*Lasiommata ominata*, Krul. (= *petropolitana*, Fabr.-Btl.) = *hiera*, auct. nec. Fabr.:—I have recorded this species on Mt. Olympus on the



strength of information from Querci, but a confirmation of it will be a good thing, for he tells me he only found two or three specimens, which he determined rather hurriedly and, at once, sent off to America, so that he cannot be absolutely sure they were not dark examples of *maera*.

*Eumenis allionii*, Geyer-Hübner = *fatua*, Freyer, race **infracastanea**, nom. nov.:—Collecting in the hills, above Salonika, at about 300 m., on 12th August has added this species to my previous list of those found by the Quercis. It was, however, still scarcer than *statilinus*. I should deem it a race distinct from those which have hitherto been described: on the upperside the general tone of colour is deeper than usual and there is none of the whitish suffusion on the hindwing, which exists especially in the females of the other races; there is only a row of white dots, standing out sharply; on the forewing the golden rings around the ocelli are unusually broad in the female and the hind-one extends backwards and broadens towards the tornus into a beginning of a band; the underside of the hindwing is characteristic, because it is darkened by thick brown streaks, covering it uniformly, even in the female sex, whilst also the ground-colour is of a warm tone of grey; the three black streaks, which stretch across it, are well marked. This underside recalls the Syrian and Palestinian race, usually known as *sichaea*, Led., more than the nominotypical *allionii* of Greece and Asia Minor, in which the underside of the female is of a cold and pale grey, with very indefinite streaks of a slightly darker tone of colour.

*E. statilinus*, Hufn.:—I am glad to be able to determine the Macedonian race with more adequate materials than I had when I, tentatively, referred it to *vettius*, Frhst. on the strength of a single female from Mt. Olympus. The specimens which have come to hand seem to show that at Salonika there exists a much smaller race, with the underside of the hindwing's ground-colour more uniform and more brown, transitional to my cotypes of *fatuaeformis*, Vrtý., from Phanaraki, on the coast of the Bosphorus, whilst at Skala, 300 m., on the Olympus, the race is larger and most individuals must be referred to *vettius*, because of the white spaces and the white suffusions on the aforesaid surface of both sexes; the female, as a matter of fact, is often nearly uniformly greyish white, all over the hindwing underside.

*E. fagi*, Scop. = *hermione*, L., race *alcyoneformis*, Vrtý.:—A specimen from Naussa, 1200 m., in the Bermion Mts.

*E. alcyone*, Schiff., race *latevittata*, Vrtý.:—A series of specimens from a higher altitude on Mt. Olympus than the 850 m. given as the highest of *fagi* and, namely, from Prionia, at 1500 m., had been overlooked by Querci, amongst his materials of 1935. Having come into my possession, I, now, find it belongs to *alcyone*, which must, consequently, be added to my previous list, and it agrees exactly, as in the case of *fagi*, with the Italian race *latevittata*, Vrtý. Although I have not examined its "organ of Jullien," I feel sure that a small male, collected at Naussa with the aforesaid *fagi*, belongs here. Therefore, in the Bermion Mts. these two species fly together at intermediate altitudes between their ranges, as in the Apennines of Italy, and on Mt. Olympus *syriaca* flies with *fagi* up to about 850 m., whilst *alcyone* replaces them both at higher altitudes.

*Eumenis semele*, L. race *mersina*, Stdgr.:—A fine series of specimens from Skala decidedly belongs to *mersina*, as large and well charac-

terised as it ever is in Asia Minor, in every respect; the females are very much larger than those from Salonika, which I have already recorded as transitional to *mersina*, but which further materials show to belong to it quite fully, too: the Skala ones have a forewing of 32 mm. in length and an expanse between the apexes of 56, whereas the Salonika ones only have 27 and 50, respectively; besides this, the former have the fulvous of the upperside of a paler tone and partly shaded over by brown scales to a slight degree. Higher up on the Olympus, at S. Dionisio, 800 m., the race is quite different from the Skala one and belongs to *sesthes*, Frhst., as I have stated in my previous paper. Also in the Bermion Mts., at Naussa, 1200 m., there exists a comparatively small and pale race, with a broad fulvous band on the hindwing, which can be referred to *sesthes*, although the white space on the underside of the hindwings is not particularly broad, as it is described by Frühstorfer, and there, evidently, are, in this and other respects, signs of transition to *mersina*, which should, very probably, be looked upon as synxergic, for nominotypical *semele* and *mersina* seem very much to be two distinct exerges, deriving from different strains. There is no doubt that the latter, with the nearly identical *subcinericea*, Ribbe, of Andalusia, with *algerica*, Obth., with *siciliana*, Obth., of Sicily, and with *aristaeus*, Bon., of Corsica, Sardinia and Elba, have a peculiar facies, somewhat closer to that of *Eumenis persephone*, Hüb. = *anthe*, O., which inhabits Asia Minor, too. It, therefore, seems very reasonable, from all standpoints, to consider that group as the most primitive one and as directly descended from the Miocene stock of the Mediterranean region and to regard all the other races, which live further north and at higher altitudes in the mountains of the south, like *sesthes* in Greece, as having acquired a different constitution by frigoripetal variation, during the subsequent cold periods, along the Northern Mediterranean route of westward migrations, so that the two have become distinct exerges, which only intercross occasionally, when they meet, on grounds intermediate between those better suited to each of the two.

*Aulocera circe*, F., probably, race *pannonia*, Frhst.:—As far as I can judge by a few males from Skala, 300 m., the race is very similar, by its large size and by its rather broad white spaces, to the Italian *itala*, Vrtv., so that I take it to be the same as the one of Croatia, named *pannonia* by Frühstorfer, who compares it precisely with it; I have, however, no actual specimens of the latter for comparison and I have no females of the Olympus, so that I cannot be sure whether it might not, instead, belong to the Hungarian *illecebra*, Frhst., as all these races are not very sharply distinct from each other. Anyhow, it is interesting to note that there is no tendency at all to resemble the well-characterised race of Asia Minor, with decidedly small white spaces.

*Limenitis drusilla*, Bergstr = *camilla*, auct. nec L. = *rivularis*, Stichel nec Scopoli:—I have determined the race of Salonika and of the Olympus as *reducta*, Stdgr. A female of 26th April from the former locality is worth mentioning, on account of its gigantic size, equalling the largest *herculeana*, Stichel, of Dalmatia and Southern Italy (length of forewing 33 mm. and expanse between the apexes 52); the white spaces are of average size, not having the unusually broad ones of *herculeana* nor the unusually small ones of *reducta*.

*Melitaea trivialis*, Schiff.:—Having had a chance to examine the whole of the extensive series of specimens brought back by the Quercis, I

can give a better account of the nomenclature to be applied to their broad variations, as already described by Querci, himself, in *Lambillionea* of 1937, p. 27.

The I generation of Salonika had been quite rightly diagnosed as *trivia-fascelis*, Schiff.-Esp. in my paper of 1937, p. (18) for these two forms are about equal in number in it. The II generation, collected in August, is very much smaller and extremely so in many individuals. One can refer its variations, in a broad way, to three of the well-known forms: 3% of both sexes belongs to the small, heavily marked *postfascelis*, Vrty., 82% of the males and 60% of the females to the small nominotypical *trivia* known as *nana*, Stdgr., and the remaining 15% of the males and 37% of the females to the very small form of a very light, dull ochreous colour, with extremely thin black markings, usually known as *catapelia*, Stdgr., but which is also Kollar's *persea*, according to Riley, so that it should bear the latter, older, name.

At Skala, 300 m., on the Olympus, the I generation has been correctly referred, as a whole, to *fascelis*, Esp., for the form with thin markings scarcely ever appears there. Also the II generation is correspondingly darker, so that 50% of the males and 40% of the females belong to *postfascelis*, Vrty., 50% of both to the small *trivia*, named *nana*, and the remaining 10% of the females, only, to the very light form, which agrees with *persea* = *catapelia*, when very small, and with *aabaca*, Frhst. (described from Spain, as being a *didyma*!) or with *robertsi*, Btl., when not so reduced in size.

At Prionia, 1500 m., in an arid locality, the I generation is the same as at Skala and, thus, *fascelis*, more or less entirely. Of the II generation only two individuals were found, showing, at that altitude, most strains are monogoneutic; those two had the nominotypical *trivia* aspect.

At Stavros, 700 m., in a very damp valley, below the fountain, the I generation was always *fascelis*, but with a tendency to unusual melanism, due to partial blending of the extremely large black markings and to a shadowing of black scales over a part of the ground colour. This melanic form is racial also in damp localities of Asia Minor, as shown by a large series from Brussa in my collection. The II generation was not looked for and is, thus, unknown.

*M. didyma*, Esp.:—I have determined the I generation of Salonika as agreeing perfectly with *oreithya*, Frhst., of Trieste. I can now add that a few specimens of the II, collected in the hills, at about 300 m., on 14th August, also agree with *postoreithya*, Vrty., and precisely with the form which has a very light ochreous ground-colour and very thin black markings, including the marginal band, which is broken into separate, internevular, dots on the forewing.

*M. phoebe*, Knoch., race *ogygia*, Frhst., II gen. **postogygia**, nom. nov.:—I propose this name for the generation of Salonika, which was found emerging in mid-August, on the hills above that town, where the heat was scorching. It is the most minute form of the species, hitherto known, as some specimens have a length of forewing of only 15 mm. and an expanse of 25, whereas the spring generation, although it is the smallest at that season, measures 20 and 35, respectively. The colour and pattern, on both surfaces, seem to be perfectly alike in the two generations.